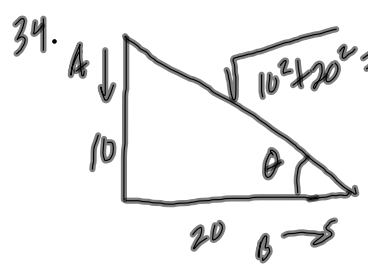
34.



$\frac{dA}{dt} = -2\frac{m}{s}$ $\frac{dB}{dt} = 1\frac{m}{s}$

find $\frac{d\theta}{dt}$

$\tan\theta = \frac{A}{B}$

implicit

$\sec^2\theta \frac{d\theta}{dt} = \frac{B\frac{dA}{dt} - A\frac{dB}{dt}}{B^2}$ $\cos^2\theta$

$= \frac{20(-2) - 10\cdot 1}{20^2}\left(\frac{20}{\sqrt{500}}\right)^2$

$= \frac{-50}{400}\cdot\frac{400}{500} = -.1\ \frac{rad}{sec}$

$= (-.1)\,rad\,\frac{360}{2\pi} = -6\,\frac{deg}{sec}$

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30.

given: $s = 16t^2\big|_{t=\frac{1}{2}} = 4$

$\frac{ds}{dt} = 32t\Big|_{t=\frac{1}{2}} = 16\ \frac{ft}{sec}$

similar triangles

find $\frac{dx}{dt}$

$\frac{x}{50-s} = \frac{30+x}{50}$ solve for x

$\frac{x}{46} = \frac{30+x}{50}$

$50x = 30\cdot 46 + 46x$

$4x = 30\cdot 46 = 345$

$50\frac{dx}{dt} = (50-s)\frac{dx}{dt} + (30+x)\left(-\frac{ds}{dt}\right)$

$50\cdot\frac{dx}{dt} - 46\frac{dx}{dt} = (30+x)(-16)$

$\frac{dx}{dt}(4) = (30+345)(-16)$

$\frac{dx}{dt} = \frac{(30+345)(-16)}{4} = -1500\,\frac{ft}{sec}$

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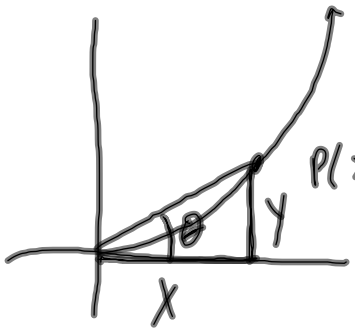
25.



$y = x^2$

$P(x, y)$

$\frac{dx}{dt} = 10 \frac{m}{sec}$

find $\frac{d\theta}{dt}$

$\tan\theta = \frac{y}{x} = \frac{x^2}{x} = x$

when $x = 3$

$\tan\theta = 3$

$\cos\theta = \frac{1}{\sqrt{10}}$

$\tan\theta = x$

$\sec^2\theta \frac{d\theta}{dt} = \frac{dx}{dt} \cos^2\theta$

$\frac{d\theta}{dt} = 10\left(\frac{1}{\sqrt{10}}\right)^2 = 1$

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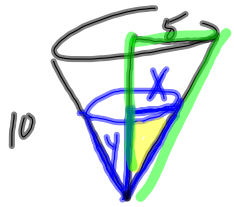
Ex 4



V $9\ ft^3/min = \frac{dV}{dt}$

$V = \frac{1}{3}\pi r^2 h$

How fast is the oter rising when it is 6 ft deep.

find $\frac{dy}{dt}$ when $y = 6$

$V = \frac{\pi}{3} x^2 y$

similar triangles

$\frac{x}{y} = \frac{5}{10}$ $x = \frac{y}{2}$

$V = \frac{\pi}{3}\left(\frac{y}{2}\right)^2 y = \frac{\pi}{12} y^3$

$\frac{dv}{dt} = \frac{\pi}{12} 3y^2 \frac{dy}{dt}$

$9 = \frac{\pi}{12} 3 \cdot 6^2 \frac{dy}{dt}$

$\frac{1}{\pi}\ ft/min = \frac{dy}{dt}$

Nov 4-12:15 PM